# Detection Of Adulterants in Chilli Powder from Deulgaon Raja Village Weekly Market

Dr. Deekshaputra Ramrao Birhade
*Shri Vyankatesh Arts, Commerce and Science College, Deulgaon Raja, Dist. Buldhana-443204*
doi.org/10.64643/IJIRTV12I9-195670-459

***Abstract*—Chilli powder is an essential component of Indian cuisine, valued for its flavour, colour, and numerous nutritional and medicinal benefits. The presence of capsaicin imparts anti-inflammatory, thermogenic, analgesic, and cardioprotective properties, while vitamins and antioxidants contribute to improved immunity and overall health. Despite its importance, chilli powder is frequently adulterated with low-cost substances such as chalk powder, starches, lead salts, and synthetic dyes to increase economic gains. Such adulteration significantly compromises food quality and poses serious health risks to consumers. The present study aims to detect adulteration in chilli powder using simple physical and chemical tests. Multiple analytical tests were performed to identify common adulterants, and the findings highlight the prevalence and potential dangers of food adulteration. This work seeks to create public awareness regarding food safety and the importance of using unadulterated chilli powder for health and well-being.**

***Index Terms*—Adulterants, Food Adulteration, Chilli powder, Rodamine B**

## I. INTRODUCTION

Chilli plants (Capsicum) are versatile, sun-loving, perennial shrubs. Capsaicin, found in chilli peppers, is a powerful nutrient dense fruit that lowers inflammation, speeds up metabolism, and lessens pain [1]. They are rich in vitamins A, C, and K which support cardiovascular and immunological health [2]. The food colouring ability of red chilli is due to presence of mixture of carotenes and xanthophylls in it [3]. They are frequently used to add taste and fire to sauces, stir-fries, and blends of dry spices all over the world. Capsaicin, the main component, has thermogenic qualities that increase metabolism and burn fat. It has anticancer, antibacterial, analgesic, and cardio protective effects [4, 5]. Capsaicin-containing creams are used to treat arthritis, inflammation, and sore muscles. They help reduce cholesterol, triglycerides, and blood pressure. Because they are high in vitamin C and antioxidants, they boost immunity and fight off free radicals. They stimulate the gastric juices, which aids in digesting, but too much of them might be problematic. Chilli can help relieve nasal congestion since it decreases mucus accumulation.

Figure:1 Chilli plant, chilli and chilli powder

Because of the food and pharmacological values, Chilli is considered as a major economic crop worldwide. India is the world's biggest producer, consumer, and exporter of chilies, which are well-known around the world for their vivid hues and range of intensities. Asian nations like Bangladesh, China, Sri Lanka, Malaysia, Singapore, Thailand, and the United Arab Emirates are the main recipients of Indian chillies. With an average yield of 3,229 kg per hectare and a production of 58.22 lakh tons, the world's chilli farming area was 18.03 lakh hectares in 2023. With 27.82 lakh tonnes, India was the world's top producer of chillies. [6]

When a crop is becoming a highly valuable industrial commodity, the natural tendency is to find fraudulent practices to increase the profit margin. Adulteration of food commonly defined as "the addition or subtraction of any substance to or from food, so that the natural composition and quality of food substance is

affected". There are evidences that, Chilli is adulterated with Sudan I–IV dyes [7-10], brick powder [10, 11], red beetroot [12, 13], almond shell [11, 14], dried tomato peel and starch [14].

Adulteration is made to increase the weight, quantity and good-looking texture to earn more profit. Following table shows the adulterant and type of disease/disorder caused by that adulterant.

Table 1: List of Adulterants present in Chilli and disorder caused by them. [15, 16]

| Sr. No. | Adulterants | Disease/disorder |
|---|---|---|
| 01 | Yellow and Sudan red dye | Cancer |
| 02 | Lead soluble salts | Lead poisoning, metal toxicity |
| 03 | Oil soluble tar | Heart disease, damage to liver, tumor |
| 04 | Brick dust | Respiratory problems |
| 05 | Rodamine B | Cancer |

Thus, it is essential to know that whether the Chilli that we are using is good, safe to use or is it adulterated with some harmful substance. This can be done by simple chemical tests.

## II. METHODOLOGY

This experimental study was carried out for the Chilli powder samples collected from Saturday weekly market of Deulgaon Raja village, Dist. Buldana (MH). This study is done for determination of various adulterants present in Chilli powder by using physical and chemical methods. Ten random samples were collected from the village, Deulgaon raja Saturday weekly market and following methods/tests are used to check the adulteration.

1. Presence of brick powder: One teaspoon of chilli powder was added in a beaker containing water. Pure chilli powder floats while adulterated will settle down.

2. Presence of artificial colour: A teaspoon of red chilli powder was added to a glass of water, change in colour of water indicates the presence of artificial colour in it.

3. Presence of Starch: Few drops of iodine was added to chilli powder taken in a test tube. Appearance of bluish colour indicates presence of starch.

4. Presence of Sudan Red: A sample of chilli powder was taken in a test tube. Dilute nitric acid is added to it. It is than filtered and in the filtrate 2 drops of potassium iodide are added. As a result of which yellow colour precipitate was formed which indicate the presence of Sudan red.

5. Presence of Rodamine B: 5 ml. of Acetone was added to chilli powder taken in a test tube. Immediate red colour appearance indicates the presence of Rodamine B.

6. Presence of red lead salts: Dilute nitric acid is added to the sample of chilli powder. The solution is filtered. Next 2 drops of Potassium Iodide is added to the filtrate. Formation of yellow coloured precipitate indicates the presence of red lead salts.

7. Presence of oil soluble coal tar: 5 ml of ether solvent was added to a test tube containing chilli powder and is shaken well. 2ml of dilute hydrochloric acid was taken in another test tube and ether layer is transferred to it. Appearance of pink/red colour of lower acid layer indicate the presence of oil soluble coal tar.

## III. RESULT AND DISCUSSION

Each sample was analyzed carefully to obtain accurate results. The observation drawn from analyzing the samples is given Table 2.

Table 2: Observations made during analysis of Chilli Powder (P = Present and A = Absent)

| Sample No. | Type of Adulterants and Results obtained for different tests | | | | | | |
|---|---|---|---|---|---|---|---|
| | Brick powder | | Brick powder | | Brick powder | | Brick powder |
| 1 | P | 1 | P | 1 | P | 1 | P |
| 2 | A | 2 | A | 2 | A | 2 | A |
| 3 | P | 3 | P | 3 | P | 3 | P |
| 4 | P | 4 | P | 4 | P | 4 | P |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | A | 5 | A | 5 | A | 5 | A |
| 6 | P | 6 | P | 6 | P | 6 | P |
| 7 | P | 7 | P | 7 | P | 7 | P |
| 8 | A | 8 | A | 8 | A | 8 | A |
| 9 | P | 9 | P | 9 | P | 9 | P |
| 10 | P | 10 | P | 10 | P | 10 | P |

## IV. CONCLUSION

From the experimental observations it is clear that all the Chilli powder samples contain adulterants as like brick powder, starch, sudan red, lead salts, coal tar and Rodamine B.

From the obtained results it is clear that Chilli powder samples collected from Deulgaon Raja weekly market were adulterated and harmful to use. One should buy packed turmeric powder from the trusted sources containing either by ISI mark or an Agmark. It is best to prepare own chilli powder from the chilli. Adulterated food causes both physical and mental disorders along with malnutrition. Hence, we must avoid eating such food. Also, the government needs to take necessary actions against the companies and individuals who for the sake of their own profit are manufacturing and selling adulterated products to consumers.

## ACKNOWLEDGEMENT

The author DRB gratefully acknowledge the Principal, SVC for providing necessary lab facilities to carry out this work.

## REFERENCES

[1] S Sanati, B Razavi, H Hosseinzadeh, Iranian Journal of Basic Medical Sciences; 21(5), 2018, 439-448.

[2] Pooja Pantola and Pooja Agarwal, International Journal of Advance Research and Innovation, 9 (2), 2021, 30-35.

[3] M Mishra, International Journal of Development Research, 6, 2016, 8824-8827.

[4] W. D. Rollyson, C. A. Stover, K. C. Brown, H. E. Perry, C. D. Stevenson, C. A. McNees, J. G. Ball, M. A. Valentovic, P Dasgupta; J. Control. Release, 196, 2014, 96–105.

[5] Baenas, N.; Belovi´c, M.; Ilic, N.; Moreno, D.A.; García-Viguera, C.; Food Chem. 274, 2019, 872–885.

[6] Agricultural Market, Intelligence Centre, PJTAU; Chilli Outlook – January 2026

[7] Genualdi, S.; MacMahon, S.; Robbins, K.; Farris, S.; Shyong, N.; DeJager, L.; Food Addit. Contam. Part A Chem. 2016, 33, 583–591.

[8] Monago-Marana, O.; Eskildsen, C.E.; de la Pena, A. M.; Galeano-Díaz, T.; Wold, J.P.; Microchem. J. 154, 2020, 104539.

[9] Monago-Marana, O.; Eskildsen, C. E.; Afseth, N. K.; Galeano-Díaz, T.; de la Pena, A.M.; Wold, J.P. Food Chem. 274, 2019, 187–193.

[10] Sarkar, T.; Choudhury, T.; Bansal, N.; Arunachalaeshwaran, V.R.; Khayrullin, M.; Shariati, M.A.; Lorenzo, J.M.; Food Anal. Methods 16, 2023, 721–748.

[11] Galvin-King, P.; Haughey, S.A.; Elliott, C.T.; Food Control 88, 2018, 85–97.

[12] Dhanya, K.; Syamkumar, S.; Siju, S.; Sasikumar, B.; Food J. 113, 2011, 656–668.

[13] Ndlovu, P.F.; Magwaza, L.S.; Tesfay, S.Z.; Mphahlele, R.R.; Food Res. Int. 157, 2022, 111198.

[14] Oliveira, M.M.; Cruz-Tirado, J.P.; Barbin, D.F. Food. Sci. Food Saf. 18, 2019, 670–689.

[15] Kirti Kapoor, Manju Bala, Poonam Choudhary, D. Mridula, R.K. Singh, Asian Journal of Dairy and Food Research, 43 (3), 2024, 539-543.

[16] Margi Gandhi, Rajashree Mashru, International Journal of Research & Review, 6 (12), 2019, 107-112.